

## Recent developments in the psychology of crowds and collective behaviour

Article (Accepted Version)

Drury, John (2020) Recent developments in the psychology of crowds and collective behaviour. *Current Opinion in Psychology*, 35. pp. 12-16. ISSN 2352-250X

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## **Recent developments in the psychology of crowds and collective behaviour**

### **Highlights**

Experiences in crowds and protests can lead to psychological changes which are sustained by group processes of support and communication.

Riots can spread across locations via shared identity and influence among participants or via empowerment in relation to perceived police weakness.

Social support among survivors is common in mass emergencies and can be facilitated by informed action by professional groups.

Pedestrian behaviour varies based on whether they are part of a physical crowd, in which people are simply together in the same space, or a psychological crowd, in which people share a social identity.

Mass gatherings can be the basis of improvements in health and changes in attitudes, but they can also be a source of risk through the same social identity processes.

Research on crowd behaviour has long transcended the narrow obsession with violence that marked its origins [1, 2]. Today, studies are much more representative of the variety of crowd events and phenomena. The concern with understanding collective violence still remains a significant strand. Yet the emergence and development of the social identity approach has meant that the limiting assumptions of mindlessness that have hampered psychology in the

past have given way to novel insights in the study of crowd conflict as well as in relation to numerous peaceful and less dramatic crowd events.

This review of recent developments in research on the psychology of crowds and collective behaviour is divided into four areas. The first two sections cover the most well-established topics: crowd conflict and behaviour in mass emergencies. The second two sections cover topics where social psychology has only recently come together with other disciplines: pedestrian dynamics and mass gatherings. In each case, the social identity approach provides many of the concepts, research questions and hypotheses that have driven novel developments.

### **Crowds and conflict**

In the broad area of crowds and conflict, in recent years there have been significant advances in addressing two questions. First: what is the nature and process of psychological change in participants of protest events? Second: how do urban riots develop and spread to different locations?

Participants in protest crowds can experience meaningful changes in identity, and certainly such events are locations where there is creative discussion about shared identity [3]. Recent research has analysed experiences of change and suggested some of the processes. Drury and Reicher [4] used participant observation to show how identity-based definitions of legitimacy can be transformed through intergroup dynamics. In this study, participants in environmental direct action changed from defining themselves in terms of humanistic pacifism to a more pragmatic approach when the violence from police and security guards served to reveal to them that social forces (power, institutions) were more influential than individual morality.

The literature on psychological change in crowds, protests and social movements is somewhat dispersed across different disciplines. Vestergren and colleagues' systematic review [5] both consolidated this literature and derived from it a new typology that usefully captures the range of changes. They divided psychological changes into two overall types: 'objective' change measurable by an observer (marital status, children, relationship ties, work-life/career, extended involvement, and consumer behaviour) and 'subjective' self-reported change (identity, empowerment, legitimacy, radicalization/politicization, sustained commitment, self-esteem, well-being, 'traits', self-confidence, religion, organizing, knowledge and home skills). In terms of process, this systematic review builds on previous work pointing to the role of intergroup dynamics, as described in the elaborated social identity model (ESIM; see [4]), as a mechanism of change. Police actions perceived as illegitimate and indiscriminate serve to re-position crowd members psychologically, changing identities. This model was extended by Vestergren's longitudinal ethnographic study of an environmental direct action campaign. First, this study demonstrated for the first time that most of the changes shown in the previous literature could occur in single protest campaign [6]. Second, the study showed the role of group processes (of support and communication) in sustaining over time the radicalized identities formed through conflict with police [7].

In relation to the question of the spread of riots, the 2011 English riots have been the subject of considerably scholarly attention – with over 140 peer-reviewed publications at the last count. The events involved an estimated 20,000 people, with over 100 riot events in 89 different locations [8]. Anti-police sentiment was a key motivation [9] and participants felt empowered by successfully challenging police [10]. Control of familiar space was a further motivation [11]. A study of the emergence of conflict in two London location demonstrated

the applicability of an ESIM analysis, by showing that conflict arose when police actions were perceived as an illegitimate attack on community members [12].

One of the main predictors of rioting is rioting elsewhere [13]. However, till now, social psychological explanations for this process have been lacking. Three recent studies have addressed this question. In each of these studies, the authors triangulated multiple sources to construct narrative of events and then analysed interviews from the LSE Guardian *Reading the Riots* dataset [14] to understand participants' subjective experiences. Stott et al. [15] found that, in initial rioting in Tottenham, collective action based on a shared antagonism to the police served to create police vulnerability. This empowered participants, and was associated with a change in group norms from confronting police to collective looting as people moved to adjacent districts. Ball et al. [16] showed that rioting in nearby Enfield was a result of participants converging from Tottenham and other locations to create conflict as a social identity-based expression of power. In analysis of how rioting spread to new participants and locations, Drury et al. [8] found evidence for two pathways of influence: "cognitive" and "strategic". For some participants, shared identity with those involved in previous rioting was the basis of influence. For others, previous rioting demonstrated the vulnerability of a common enemy (the police) and hence was empowering.

Two other developments in research on crowds and conflict are worth briefly mentioning. First is work which has shown how experiences of self-expansion in the crowd at protest events can motivate collective action participation (especially when activist identity is weak) [17] and mediate the relationship between identity and collective action intentions in such protest crowds [18]. This work adds to the existing scholarship on empowerment via collective action and dovetails with Vestergren et al.'s work [6, 7] on the learning opportunities that collective action can provide. The second development is in the policing of football crowds [19, 20], which is covered in another paper in this special issue.

## **Collective behaviour in emergencies and disasters**

Recent overviews of research on collective behaviour in emergencies and disasters reinforce the argument that explanations which posit mindlessness – including ‘mass panic’ and herding – are wrong [21]; rather, the main danger in evacuations isn’t over-reaction but underreaction [22]. A recent review brings together previous studies which suggest that the cooperation that occurs in many emergencies and disasters is explicable in terms of social identity processes, either reflecting existing relations or via an emergent sense of groupness arising from the experience of common fate [23]. This explanatory framework has recently been applied for the first time to the recovery period following flooding in research which has shown the multiple sources of shared identity following such an event [24] and the ways that the benefits of disaster communities can be maintained in the recovery phase (e.g., commemorations to make the identity salient) [25].

Similar processes of emergent groupness and social support have been identified among children of different social groups following an earthquake; although here salience of existing intergroup differences was also found to reduce cooperation [26]. These findings have implications for the practice of those professional groups involved in emergency management. Recommendations include understanding group psychology, working with group norms, using communication to build shared identity with the public, accommodating the public urge to help, working with group prototypes, and providing ongoing material support for the disaster community [27].

## **Pedestrian dynamics**

The field of pedestrian dynamics consists largely of work in mathematics, scientific computing, engineering and physics, but is increasingly recognised as needing the evidence, theory and methods of social psychologists [28, 29]. A significant development in the

ambition to bring together crowd dynamics approaches with crowd psychology came with the recent publication of a glossary of terms [30]. Since the disciplines use different vocabularies – with even different understandings of what a crowd is – this publication, which is already widely cited, will progress interdisciplinary research and theory.

There are already a number of recent publications that have brought modern psychological concepts into pedestrian dynamics research. Haghani and Sarvi's large experiment [31] showed that copying others' evacuation route is moderated by crowd density. Studies of the micro-interaction of pedestrian movement have modelled how a pedestrian aligns their motion with that of a neighbour and how these simple interactions combine within a crowd to produce collective behaviour from the bottom up [32, 33].

A key concept that social psychology has added to these (often individualistic) accounts of crowd relations is the distinction between *physical* and *psychological* crowds [34]. The former refers simply to people in the same space, while the latter refers to crowds where people share social identity. Field experimentation has shown that, in contrast to physical crowds, pedestrians in psychological crowds walk more closely together and consequently move more slowly; in addition those outside the crowd treat it as an entity [35]. When two psychological crowds are in counterflow, people in each crowd group more closely together [36].

### **Mass gatherings psychology**

In the past, where the study of mass gatherings included reference to crowd psychology it has predominantly been in terms of so-called 'stampedes' caused by 'panic'. However, most events called 'stampedes' involve a static crowd crush rather than a running crowd [37]; and a recent review shows that research on these events is moving away from the notion of panic as an explanation [38]. In place of this concern with the pathologizing effects of mass

gatherings is an increasingly large body of research demonstrating the positive psychological effects of participation of such events as religious mass pilgrimages, sports events and other crowds. Some of these events are associated with strong collective emotions [39], which may in turn have psychological consequences. For example, participants at a scouts gathering experienced enhanced emotional synchrony which was associated with greater ingroup identification, identity fusion, pride, openness to experience, self-esteem, positive affect, and conformity to scouting values [40].

The basis of positive emotional experiences in crowds such as those at mass religious pilgrimages is the relational transformation towards sharing a social identity with others, which leads to various sources of positive affect [41]. First, there is recognition: it feels good to be understood for who one is. Second, there is validation: one's values and emotions are reflected back, and hence confirmed, by others who feel the same way. Third, there is solidarity, which means an increase in both giving and receiving support from others in the crowd [42].

One of the most striking recent findings is that attending mass gatherings can enhance health and wellbeing [43]. Studies of the Magh Mela, an annual Hindu pilgrimage in India, show that this can occur through relational transformations [44]. Social support reduces stress. Shared identity provides a positive frame for sensory experiences that might otherwise be distressing; whereas 'their' crowd noise is irritating (and even threatening) [45], 'our' crowd noise is not 'noise' at all but an enjoyable expression of our values. Positive emotion also contributes to wellbeing. These same social identity processes can also contribute to health risk, however. For example, greater trust might mean less caution in sharing toothbrushes or combs [44]. Reduced disgust at such events has been shown experimentally to mediate the effects of shared identity on lowered health risk perceptions [46].



As well as reflecting identity and promoting identity-based emotion and health, attendance at a mass gathering can *change* identity and relations with people in other groups. This observation was first made of the Hajj a number of years ago (for example in Malcolm X's autobiography) but the underlying process was recently shown to comprise both contact with different groups and identification with the crowd [47].

## **Conclusions**

The vigour and growth in research on crowds and collective behaviour testifies to the interest in these topics and the generative nature of the theories employed. Specifically, the social identity approach continues to be an extremely productive framework, and has been the basis of connecting social psychology with other disciplines, including criminology, urban studies, sociology, engineering, medicine, and management. The interest in and breadth of research in the crowd affirms Reicher's recent argument [48] that studying the crowd is important not only for psychology but for the social sciences as a whole, for a number of reasons, including the methodological innovations that can be developed, the generation of new theoretical concepts (including about the nature of the self and the group), and the way that studying the crowd provides insights into the way that everyday social relations are created, consolidated, and changed [49].

[1] Drury J: **Gustave Le Bon's "Psychologie des Foules": A commentary and evaluation.** In G Le Bon (1895). *Psychologie des Foules*. La Société Enrick B. Editions; 2020.

[2] Stott C, Drury J: **Contemporary understanding of riots: classical crowd psychology, ideology and the social identity approach.** *Public Underst Sci* 2017, **26**(1):2-14.

[3] Uluğ ÖM, Acar YG: **'Names will never hurt us': A qualitative exploration of çapulcu identity through the eyes of Gezi Park protesters.** *Brit J Soc Psychol* 2019, **58**(3):714-29.

DOI:10.1111/bjso.12305

[4] Drury J, Reicher S: **The conservative crowd? How participation in collective events transforms participants' understandings of collective action.** In *From rage to revolution: Models of dramatic social change*. Edited by Wagoner B, Moghaddam F, Valsiner J. Cambridge University Press; 2018:11-28.

[5] Vestergren S, Drury J, Chiriac EH: **The biographical consequences of protest and activism: A systematic review and a new typology.** *Soc Movement Stud* 2017, **16**(2):203-21. doi.org/10.1080/14742837.2016.1252665

[6] Vestergren SK, Drury J, Hammar Chiriac E: **How participation in collective action changes relationships, behaviours, and beliefs: an interview study of the role of inter- and intragroup processes.** *J Soc Political Psychol* 2019, **7**(1):76-99.  
doi:10.5964/jspp.v7i1.903

[7] Vestergren S, Drury J, Chiriac EH: **How collective action produces psychological change and how that change endures over time: A case study of an environmental campaign.** *Brit J Soc Psychol* 2018, **57**(4):855-77. DOI:10.1111/bjso.12270

This paper reports thematic analysis of interviews of protest participants (N = 28) carried out as part of an ambitious longitudinal panel/ethnographic study lasting 18 months. Many participants became politicized through an unexpectedly confrontational encounter with police. The paper presents an analysis of the process whereby the new radical identities were sustained over time or else declined, suggesting that intragroup processes (of support and communication) condition the effects of intergroup dynamics (i.e., crowd conflict) on sustained psychological change.

[8] Drury J, Stott C, Ball R, Reicher S, Neville F, Bell L, Biddlestone M, Choudhury S, Lovell M, Ryan C: **A social identity model of riot diffusion: From injustice to**

**empowerment in the 2011 London riots.** *Euro J Soc Psychol* 2019,

<https://doi.org/10.1002/ejsp.2650>

This study combining thematic analysis of interviews with rioters (N = 68) with multiple sources to create triangulated narratives of three South London riots sought to analyse the underlying psychological process determining both the boundaries and the sequence of urban riot diffusion. In line with a new model proposed in the paper, there was evidence for two pathways of influence: “cognitive” and “strategic”. For some participants, previous rioting was highly self-relevant, and shared identity was the basis of their subsequent involvement. For others, previous rioting was empowering because it demonstrated the vulnerability of a common enemy (the police). Whereas previous accounts of the psychology of diffusion have been based largely on speculation, this account is based on detailed empirical analysis.

[9] Newburn T, Diski R, Cooper K, Deacon R, Burch A, Grant M: **‘The biggest gang’?**

**Police and people in the 2011 England riots.** *Polic Soc* 2018, **28**(2):205-22.

<https://doi.org/10.1080/10439463.2016.1165220>

[10] Newburn T, Deacon R, Diski B, Cooper K, Grant M, Burch A: **‘The best three days of my life’: Pleasure, power and alienation in the 2011 riots.** *Crime Media Cult* 2018

14(1):41-59.

[11] Tiratelli M: **Reclaiming the everyday: the situational dynamics of the 2011 London Riots.** *Soc Movement Stud* 2018, **17**(1):64-84.

<https://doi.org/10.1080/14742837.2017.1348942>

[12] Stott C, Drury J, Reicher S: **On the role of a social identity analysis in articulating structure and collective action: The 2011 riots in Tottenham and Hackney.** *Brit J Criminol* 2016, **57**(4):964-81. doi: 10.1093/bjc/azw036

- [13] Aidt T, Leon G, Satchell M: **The social dynamics of riots: Evidence from the Captain Swing riots, 1830-31**. Cambridge University Working Paper 2017. Available from <http://sticerd.lse.ac.uk/seminarpapers/pspe02052017.pdf>
- [14] Guardian / LSE: **Reading the riots: Investigating England's summer of disorder**. The Guardian & LSE 2011.
- [15] Stott C, Ball R, Drury J, Neville F, Reicher S, Boardman A, Choudhury S: **The evolving normative dimensions of 'riot': Towards an elaborated social identity explanation**. *Euro J Soc Psychol* 2018, **48**(6):834-49. DOI: 10.1002/ejsp.2376
- [16] Ball R, Stott C, Drury J, Neville F, Reicher S, Choudhury S: **Who controls the city? A micro-historical case study of the spread of rioting across North London in August 2011**. *City* 2019, **23**(4-5):483-504. <https://doi.org/10.1080/13604813.2019.1685283>
- [17] Besta T, Zawadzka AM: **Expansion of the self of activists and nonactivists involved in mass gatherings for collective action**. *Group Process Interg* 2019, **22**(2):182-99. DOI: 10.1177/1362688819830022
- [18] Besta T, Jaśkiewicz M, Kosakowska-Berezecka N, Lawendowski R, Zawadzka AM: **What do I gain from joining crowds? Does self-expansion help to explain the relationship between identity fusion, group efficacy and collective action?**. *Euro J Soc Psychol* 2018, **48**(2):152-67. <https://doi.org/10.1002/ejsp.2332>
- [19] Stott C, Pearson G, West O: **Enabling an Evidence-Based Approach to Policing Football in the UK**. *Policing: A Journal of Policy and Practice* 2019, **23**(1):1-12. <https://doi.org/10.1093/polic/pay102>
- [20] Stott C, West O, Radburn M: **Policing football 'risk'? A participant action research case study of a liaison-based approach to 'public order'**. *Polic Soc* 2018, **28**(1):1-6. <https://doi.org/10.1080/10439463.2015.1126267>

- [21] Haghani M, Cristiani E, Bode NW, Boltes M, Corbetta A: **Panic, irrationality, and herding: Three ambiguous terms in crowd dynamics research.** *J Adv Transport* 2019. <https://doi.org/10.1155/2019/9267643>
- [22] Kinsey MJ, Gwynne SM, Kuligowski ED, Kinatader M: **Cognitive biases within decision making during fire evacuations.** *Fire Technol* 2019, **55**(2):465-85.
- [23] Drury J: **The role of social identity processes in mass emergency behaviour: An integrative review.** *Euro J Soc Psychol* 2018, **29**(1):38-81. <https://doi.org/10.1080/10463283.2018.1471948>
- [24] Ntontis E, Drury J, Amlôt R, Rubin GJ, Williams R: **Emergent social identities in a flood: Implications for community psychosocial resilience.** *J Community Appl Soc Psychol* 2018, **28**(1):3-14. DOI: 10.1002/casp.2329
- [25] Ntontis E, Drury J, Amlôt R, Rubin GJ, Williams R: **Endurance or decline of emergent groups following a flood disaster: Implications for community resilience.** *Int J Disast Risk Re* 2020, **45** <https://doi.org/10.1016/j.ijdr.2020.101493>

This paper reports an interview study with 19 affected residents, conducted 15 months after severe flooding. The immediate benefits of emergent groups in disasters are well established [23], but it is also well known that such groups fade in the recovery phase, precisely when they are needed to help people cope with secondary stressors. Thematic analysis of the interviews shows for the first time some of the strategies developed by people to maintain the sense of groupness, including commemorations, meetings and informal talk.

- [26] Vezzali L, Andrighetto L, Drury J, Di Bernardo GA, Cadamuro A: **In the aftermath of natural disasters: Fostering helping towards outgroup victims.** In *Intergroup helping: The positive side of intergroup behaviour*. Edited by Zagefka H, van Leeuwen E. Springer; 2017:305-30.

- [27] Drury J, Carter H, Cocking C, Ntontis E, Tekin Guven S, Amlôt R: **Facilitating collective resilience in the public in emergencies: Twelve recommendations based on the social identity approach**. *Front Public Health* 2019, **7**:141. doi: 10.3389/fpubh.2019.00141
- [28] Sieben A, Schumann J, Seyfried A: **Collective phenomena in crowds—Where pedestrian dynamics need social psychology**. *PLoS One* 2017, **12**(6). e0177328
- [29] Seitz MJ, Templeton A, Drury J, Köster G, Philippides A: **Parsimony versus reductionism: how can crowd psychology be introduced into computer simulation?**. *Rev Gen Psychol* 2017, **21**(1):95-102.
- [30] Adrian J, Amos M, Baratchi M, Beermann M, Bode N, Boltes M, Corbetta A, Dezechache G, Drury J, Fu Z, Geraerts R et al.: **A glossary for research on human crowd dynamics**. *Collective Dynamics* 2019, **4**(A19):1-13.
- [31] Haghani M, Sarvi M: **Following the crowd or avoiding it? Empirical investigation of imitative behaviour in emergency escape of human crowds**. *Anim Behav* 2017, **124**:47-56.
- [32] Warren WH: **Collective motion in human crowds**. *Curr Dir Psychol Sci* 2018, **27**(4):232-40.
- [33] Rio KW, Dachner GC, Warren WH: **Local interactions underlying collective motion in human crowds**. *P Roy Soc B-Biol Sci* 2018, **285**(1878):20180611.
- [34] Neville F, Novelli D, Reicher S, Drury J: **Shared identity transforms social relations in imaginary crowds**. *Group Process Interg* 2020.
- [35] Templeton A, Drury J, Philippides A: **Walking together: Behavioural signatures of psychological crowds**. *Roy Soc Open Sci* 2018, **5**(7):180172.  
<http://dx.doi.org/10.1098/rsos.180172>

This paper reports the first evidence of the role of social identity processes in pedestrian flow. Building on previous work by Novelli et al. (2010) which had shown how group relations shape variability in ‘personal space’ behaviours, this paper reports a field experiment comparing a physical crowd and a psychological crowd in identical walking tasks. Compared to the physical crowd, people in the crowd primed to share a social identity walked together more closely and consequently move more slowly, findings which have clear implications for the planning of events and public spaces.

[36] Templeton A, Drury J, Philippides A: **Placing large group relations into pedestrian dynamics: Psychological crowds in counterflow**. *Collective Dynamics* 2020.

[37] Alluri S, Voskanyan A, Sarin RR, Molloy MS, Ciotto GR: **It’s a crush... It’s a collapse... It’s... Wait, that’s no stampede!**. *Prehospital and Disaster Medicine* 2017, **32**(S1):S27-8.

[38] de Almeida MM, von Schreeb J: **Human stampedes: An updated review of current literature**. *Prehospital and Disaster Medicine* 2019, **34**(1):82-8.

[39] Sullivan GB: **Collective emotions: a case study of south African pride, euphoria and unity in the context of the 2010 FIFA world cup**. *Front Psychol* 2018, **9**:1252.

[40] Bouchat P, Rimé B, Van Eycken R, Nils F: **The virtues of collective gatherings: A study on the positive effects of a major scouting event**. *J Appl Soc Psychol* 2020.

<https://doi.org/10.1111/jasp.12649>

[41] Hopkins N, Reicher S, Stevenson C, Pandey K, Shankar S, Tewari S: **Social relations in crowds: Recognition, validation and solidarity**. *Euro J Soc Psychol* 2019, **49**(6):1283-97.

[42] Alnabulsi H, Drury J, Templeton A: **Predicting collective behaviour at the Hajj: place, space and the process of cooperation**. *Philos T Roy Soc B* 2018, **373**(1753):20170240.

[43] Kearns M, Muldoon OT, Msetfi RM, Surgenor PW: **Darkness into light?**

**Identification with the crowd at a suicide prevention fundraiser promotes well-being amongst participants.** *Euro J Soc Psychol* 2017, **47**(7):878-88.

[44] Hopkins N, Reicher SD: **Social identity and health at mass gatherings.** *Euro J Soc Psychol* 2017, **47**(7):867-77.

This review article brings together findings from a unique and significant programme of research on the Hindu Magh Mela – the first social psychological research of its kind.

Multiple studies were conducted using a variety of methodologies, including interviews, surveys, and experiments. Together, these show the bases of both positive and negative health affects of attending mega crowd events in the cognitive, relational and affective transformations that shape norms and conduct with others for those attending.

[45] Shayegh J, Drury J, Stevenson C: **Listen to the band! How sound can realize group identity and enact intergroup domination.** *Brit J Soc Psychol* 2017, **56**(1):181-96.

[46] Hult Khazaie D, Khan SS: **Shared social identification in mass gatherings lowers health risk perceptions via lowered disgust.** *Brit J Soc Psychol* 2019.

<https://doi.org/10.1111/bjso.12362>

[47] Alnabulsi H, Drury J, Vignoles VL, Oogink S: **Understanding the impact of the Hajj: Explaining experiences of self-change at a religious mass gathering.** *Euro J Soc Psychol* 2019. DOI: 10.1002/ejsp.2623

[48] Reicher S: **“La beauté est dans la rue”: Four reasons (or perhaps five) to study crowds.** *Group Process Interg* 2017, **20**(5):593-605.

[49] Neville FG, Reicher, SD: **Crowds, Social identities and the shaping of everyday social relations.** In *Political psychology: A social-psychological approach*. Edited by Lyons E, Hewer C. BPS /WileyMedia. 2018: 231-252



[50] Novelli D, Drury J, Reicher S: **Come together: Two studies concerning the impact of group relations on personal space.** *Brit J Soc Psychol* 2010, **49**(2):223-36.